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IMPACT OF TARIFF REDUCTION ON EXPORTS: A QUANTITATIVE ASSESSMENT OF INDIAN EXPORTS TO THE US

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Foreword

This paper quantitatively assesses likely changes in market access opportunities for Indian exports owing to tariff reductions by the USA. The study identifies particular products for India at the ISIC 4-digit level of disaggregation, which could be considered tariff sensitive. Regression analysis of the relationship between MFN tariff rates and India's exports to the US was used to assess in quantitative terms the likely impact of tariff reduction that may be agreed in the Doha Round. This analysis suggests that tariff cuts are not expected to benefit India's exports to the US in a major way. With the full implementation of the Chairman's formula for tariff cuts, increase in India's exports to the US would amount to 1.2% or 0.6% depending on the value of the B coefficient in the Chairman's formula. These findings are in all likelihood substantially due to the tariff diversion effect of NAFTA preferences in favour of suppliers in Mexico, which is a competing country in many traditional items. It is expected that reduction of MFN tariff would alleviate the trade diversion effect of the NAFTA.

The study has also attempted to decompose changes in India's total exports due to tariff reductions in the US into the competitive and market effects. The analysis suggests that the increase in India's exports would be mainly due to the competitive effect. This leads the author to conclude that it is crucial for India to improve its competitiveness vis-a-vis its competitors in different markets.

This study by Aradhna Aggarwal, was part of the research project on ' Impact on Indian industry and restructuring required to adjust to tariff proposals being considered by the Negotiating Group on Market Access (NGMA) at the WTO'. The study project was funded by the Department of Industrial Policy and Promotion, Ministry of Commerce and Industry, Government of India. It is hoped that the output of this study will provide better understanding of the strategic issues that will help the country to formulate its position on future tariff negotiations.

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Impact of Tariff Reduction on Exports: A Quantitative Assessment of Indian Exports to the US [*]

I Introduction

Tariff reduction in industry was one of the most important outcomes of the Uruguay round of multilateral trade negotiations. Although successive Rounds of multilateral negotiations had succeeded in significantly reducing tariffs on non agricultural products, the Uruguay Round alone achieved an overall reduction of 40% in average trade weighted tariffs for developed economies and 30% for economies in transition. Therefore, tariff rates agreed upon and implemented as a result of this round are significantly lower relative to tariff rates prevailing in the previous GATT Rounds. Despite the success of the Uruguay Round, substantial tariff barriers remain. While tariff rates have been significantly reduced in average terms, tariff reductions do not spread out evenly across both economies and sectors. High tariffs are commonly found in certain sectors and remain a barrier to free trade. Besides, there are 'tariff peaks' which are relatively high tariffs amidst generally low tariff levels. A 50 percent import tariff on cotton fabric while the average tariff on textiles is 5 percent would be an example of a tariff peak. Finally, there is an issue of tariff escalation in which higher duties are applied on semi-processed products than on raw materials and higher still on finished products. No import tariff on raw cacao beans, a 20 percent tariff on roasted ones, and a 60 percent tariff on chocolate bars would be an instance of tariff escalation. Tariff escalation protects domestic processing industries but discourages the development of processing activity in the countries where raw materials originate.

With a view to addressing these asymmetries, the Fourth Ministerial Conference of the WTO held at Doha has mandated negotiations that are aimed at high tariffs, tariff peaks and tariff escalations as well as non tariff barriers. Paragraph 16 of the Doha Development Agenda ("DDA") sets out four general objectives for negotiations on market access for non-agricultural products:

[*] I would like to thank Professors Arvind Virmani and B. N. Goldar for useful suggestions and comments. My thanks are due to Bandita Pal for her valuable research assistance.

- to reduce or as appropriate eliminate tariffs (including the reduction or elimination of tariff peaks, high tariffs, and tariff escalation) on a comprehensive group of products (without a priori exclusions) and, in particular, on products of export interest to developing countries;
- to reduce or as appropriate eliminate non-tariff barriers;
- to take fully into account the special needs and interests of developing and least developed countries;
- to include in the modalities to be agreed appropriate studies and capacity-building measures to assist least-developed countries to participate effectively in the negotiations.

Although in many countries there is concern about loss of government revenue, the potential weakening of their competitiveness, flooding of their markets by goods from developed countries, it is generally believed that these negotiations would secure further trade liberalisation and offer improved market access for all members, in general and developing country members in particular. Developing countries face disproportionately high trade barriers in manufactures and barriers to their manufactures exports account for around 70 percent of the total barriers faced by their exports (Hertel and Martin 1999). Though tariff rates on all industrial products imported by developing countries from all sources were reduced by 40%, on average from 6.3% to 3.8%, the average reduction on products imported from developing countries was 37%. This reflects mainly the lower-than average reductions on the products exported mainly by these countries. These are for instance, fish and fish products (26%), textiles and clothing (22%), leather, rubber and footwear (18%) and transport equipment (23%). The inclusion of manufactures trade in the tariff reduction negotiations therefore is particularly important for developing countries.

Nevertheless, reduction/ elimination of tariffs may not result in unambiguous gains in market access due to insensitivity of foreign demand and or/ of domestic industry to tariff changes. Besides, the products on which substantial tariff reduction is achieved may not be of export interest to the country or they may not be in accordance with its domestic

priorities. While negotiating tariff cuts, therefore, the government is faced with certain strategic issues. These include identifying priority markets for improved access and domestic industry sensitivities to such opportunities. The study process that examines such issues will help these countries to formulate their position on future tariff negotiations in a better manner. Against that background, this study aims at identifying particular products for India at the ISIC 4-digit level of disaggregation which could be considered tariff sensitive. Market access opportunities in these products would expand for India after further tariff reductions by its trading partners. The study quantitatively assesses the potential increase in India's exports resulting from the tariff reduction negotiations and decomposes the total potential changes in exports into the market-induced and competitiveness-induced effects. The study focuses on Indian exports to the US and provides quantitative estimates of how Indian exports will change as a result of multilateral tariff reductions by the US. Our choice of the US was mainly guided by the data availability constraints. While we had detailed data on the US trade, such information was not available for the EU countries. However, our choice can be justified by the fact that the US is a major trade destination for Indian exports. In 1999-2000, it alone accounted for 24.4% of India's exports (GOI, 2002). During the ten-year period (1990-91 to 2000-2001), the US share in India's exports increased from 15.6% to over 20%. It is expected that tariff reductions by the US would benefit India's market access as there are prominent tariff peaks in the United States (above 15 percent) and despite the supposed decline in the average tariff of imports from all sources, the share of imports for which tariff rates imposed are above 5 percent is still close to 20 percent for the country.

The scheme of the paper is as follows. The following section provides a brief overview of the US tariff structure. Section III describes briefly the patterns and growth of India's exports to the US. Section IV outlines the theoretical framework adopted in the study to analyse the impact of GATT tariff negotiations on market access, data and methodology. Section V discusses the estimates of the model and assesses quantitatively the extent to which tariff reduction will provide market access in different sectors. It also decomposes the total market access effect into the competitive and market effects and analyses their importance. Finally, Section VI concludes the analysis.

II Tariff structure of the US : An overview

The WTO organises and reports the tariff data supplied by its member countries on an annual basis in the *Integrated Data Base (IDB)*. The objective is to disseminate information on tariff structure of member countries in a comprehensive framework to facilitate the analytical work that is required to advance the negotiations. The IDB contains WTO Members' annual notifications of tariff and trade information, linked at the level of tariff lines. It contains imports by country of origin, in value and quantity, by tariff line, and MFN current bound duties and current applied duties. Product descriptions at the tariff line level are also part of the database. We utilised this database to extract information on the US tariff structure. Data on *ad valorem* duty and imports by tariff line was available for 7375 bound tariff lines[1]. Table 1 shows the distribution of these bound rates prevailing in the US in the year 2001. There are two things worth noting here. First, over one third of tariff lines are subject to 5% or more tariff in the United States. Second, despite the supposed decline in the average tariff of imports from all sources, the share of imports for which tariff rates imposed are above 5 percent is still close to 20 percent. Over 7% of total US imports are still subject to tariff peaks (15% and above).

Table 1: The US tariff structure : 2001

AV duty	# of TLS	% of Imports out of Total	% of TLs
0	2632	46.77	35.7
1	450	2.36	6.1
2	495	22.10	6.7
3	634	4.81	8.6
4	761	4.67	10.3
5	381	3.55	5.2
6	566	3.50	7.7
7	235	0.90	3.2
8	337	1.87	4.6
9	138	0.74	1.9
10	146	0.82	2.0
11	56	0.37	0.8

[1] Unbound tariff lines in the US are subject to less than 5% tariff. Therefore we decided to exclude them from the analysis.

12	81	0.15	1.1
13	52	0.07	0.7
14	55	0.15	0.7
15	137	0.31	1.9
15+	219	6.82	3.0
	7375	100	100

Source WTO- IDB

At the sector level, high tariff rates are prevailing mainly in footwear, textile, clothing, rubber, travel goods and chemicals. According to one estimate, some 47 percent of United States imports of leather and rubber footwear; 19 percent of its imports of chemicals and photographic supplies and 23 percent of its imports of minerals, precious stones and metals have tariffs of 5- 10 percent in a post-UR period (*Alburo, 1999).*

III India's trade with the US

III.1 Growth

Currently, India is one of the top 20 countries exporting to the US . India's exports to the US grew rapidly during the 1990s. The average annual growth rate in merchandise exports to the USA that was around 7% during 1985-90 went up to 16% during the late 1990s. The country registered 21 percent growth in 2001-2002 - highest ever in last one decade- in merchandise exports to USA. If judged in terms of overall global exports to the USA whereby out of the top 25 countries, 14 countries registered positive growth rate in exports to USA, India's performance was encouraging one. India's merchandise exports outsmarted the growth in service exports by 1.4%. India ranked 19th in the list of global merchandise exporters to the US in 2002 consolidating its position from 2001when it ranked 22nd. Country's merchandise exports to USA at the end of 2002 stood at US$ 11.82 billion signifying impressive growth over previous year's US$ 9.74 billion. India's share in total USA merchandise imports in 2002 marginally upped to 1.02% from 0.86% in the previous year.

Table 2: India's merchandise exports to the US : Average annual growth rate (%)

Year	Average annual growth rate (%)
1985-90	7.14
1991-96	11.82
1997-02	11.93
1997-02*	16.10

*excluding 2000-2001
Source : US census Bureau

One must also observe that the trade balance between India and the US is tilted in India's favour in the 1990s (Table 3). In 1985 the trade balance in India-US trade was $652 millions. By the year 2002, it increased twelve times to $7717.4 millions.

Table 3: India-US trade balance for selected years: 1985-2003 (million US $)

Year	India's exports	India's imports	Trade balance
1985	1641.9	2294.7	652.8
1990	2486.2	3196.8	710.6
1995	3295.8	5726.3	2430.5
2000	3667.3	10,686.6	7019.3
2002	4101.0	11818.4	7717.4
2003 (Jan-Oct.)	4105.2	11196.1	7090.9

Source: US Census Bureau

III.2 Sectoral composition

Table 4 shows that gems and jewellery alone accounted for 50% of the total India's exports to the US during the ate 1990s. Other low tech sectors such as food and beverages, textiles and clothing, paper and paper products and metal and metal products contributed over 25% of the total exports. Together they accounted for 75% - 80% of total exports. Slightly over 20% of India's total exports were accounted for by high value added high technology sectors.

Table 4: Sectoral composition of India's exports to the US : average for 1997 to 1999

	Share in total India's exports (%)	Share of India in US imports (%)
Food,beverages, Tobacco	4.32	0.63
Textiles and clothing	7.26	3.42
Paper and paper products	4.69	1.24
Leather, fur and leather products	0.15	0.02
Wood and wood products	0.27	0.06
Chemical and chemical products	6.82	0.55
Petroleum and petroleum products	2.54	0.44
Plastic and Rubber products	3.10	0.51
Non metallic products	1.60	0.59
Metal and Metal products	8.74	0.60
Machinery	7.90	0.12
Transport equipments	1.85	0.05
Other manufacturing products	1.00	0.09
Manufacture of jewellery and related articles	49.75	12.51

Source: Trade and Production database, 1989-99

For analysing India's competitiveness across sectors however, it is important to examine its share in total US imports. Table 4 provides figures for India's share in US imports across broadly classified sectors. One may observe that India has managed to display an impressive show in only gems and jewellery, textiles and paper and paper products. These sectors accounted for 12.5%, 3.4% and 1.2% of total US imports respectively over the period 1997 to 1999. In all other sectors India's share was much less than even 1%.

Table 5 presents India's share in US imports by tariff rate. These figures are based on the 8-digit level of disaggegation and pertain to the year 2001. It shows that, on average, India's share in the items that were subject to 0 to 5% tariff rates was as low as 1.12%. On the other hand, in the items which were subject to 20%-25% tariff rates, India's share was 6%. Apparently, India is competing in the items that are subject to high tariff rates. India's exports thus face high tariff barriers in the US markets.

Table 5: India's share in the US imports by tariff rate category at the 8-digit level of classification: 2001

AV duty	% of India's Export in the US imports
0-5	1.12
5-10	2.96
10-15	1.82
15-20	2.45
20-25	5.83
25-30	2.39
30+	1.08

Source: WTO-IDB

At the 4-digit level of aggregation, one observes a clear cut negative correlation between the tariff rate and India's share in the US imports (table 8). India is thus competing mainly in the sectors where tariff rates are higher.

Table 6: India's share in the US imports by tariff rate category at the 4-digit level of classification

Tariff rate	India's share in the US imports (%)
5 and above	2.02
5%-4%	1.84
4%-3%	1.28
3%-2%	0.33
2%-1%	0.16
1%-0%	0.13

Source: Trade and Production database

In sum, three things are evident from the above analysis. *One,* although India's exports have been rising rapidly, the share of India in the US imports is still very small. *Two,* although India's exports to the US are diversified over the years, low-tech sectors still account for $4/5^{th}$ of India's total exports. *Finally,* the products in which India is competing are subject to high tariff rates. One may therefore conclude that there is an immense potential for India's exports to grow after tariff reductions.

In what follows, we shall outline the theoretical framework within which the impact of negotiating tariff cuts in *GATT* on market access will be analysed.

IV Theoretical framework

Market access is interpreted in GATT to reflect the competitive relationship between imported and domestic products. When a government agrees to reduce its import tariff on a particular product, it alters the competitive relationship between imported and domestic units of the product in favour of imported units, and it thereby provides greater market access to foreign producers. Thus, by agreeing to lower its tariff, the government is engineering an outward shift of its import demand curve—that is, all else equal, a greater volume of imports will be demanded at any given price from foreign exporters. As a result, foreign exporters can expect to enjoy an increase in sales into the domestic market.

GATT negotiations facilitate exchange of market access between countries. Each government agrees to undertake tariff concessions which shift out its import demand curve and thereby provide greater market access to foreign exporters, in exchange for the market access benefits that its own exporters enjoy when foreign governments similarly undertake obligations which shift out their respective import demand curves. While providing market access to foreign exporters, therefore a government achieves greater access to foreign markets for its exporters also. Tariff reductions may thus be viewed as the price that must be paid in order to gain access to the foreign market.

However, negotiating a low tariff is not sufficient to establish high market access. Price is often not necessary to enhance the ability to export in the foreign markets for two reasons : first, tariff reduction may not result into lower export prices (see for instance, Bagwell and Staiger 2001) and second, trade patterns may not be very sensitive to changes in tariff rates. Therefore, the impact of tariff reduction on market access is largely determined by: one, relative prices changes and two, sensitivity of the trade patterns to price changes.

IV.1 Tariff reduction and export prices

If after negotiating a commitment from a trading partner to reduce its tariff on a particular product, that trading partner subsequently imposes internal taxes on the sale of the product in a manner which favour domestic over imported products, tariff reduction negotiations would not change the relative prices. Drafters of the GATT addressed this problem by incorporating Article III of GATT. It provides protection against such practices by requiring that member governments must abide by the rule of "national treatment" when setting their domestic policies. National treatment requires that, once foreign products enter the domestic market, they must be treated in the same way as domestic products.

While rules like Article III can provide some assurance against certain kinds of targeted domestic policy actions that would undermine the meaning of a tariff concession, any of a host of domestic policies could be crafted to sever the effective link between negotiated tariff concessions and market access and yet not be in direct violation of any of GATT's rules. Many labour and environmental standards fall into this category (Hudec, 1990). This problem in GATT was addressed by including the provision of 'reciprocity'—the balance of negotiated market access commitments. The prospect of non-violation complaints is included that secures the cross-country balance of negotiated market access commitments (although not necessarily their levels) against erosion as a result of future changes in domestic policies. Under a successful nonviolation complaint, the complaining country is entitled to a 're-balancing' of market access commitments : either its trading partner finds a way to offer compensation for its domestic policy change through other policy changes that restore the original market access or it grants additional market access on other products, or the complaining government is permitted to withdraw an equivalent market access concession of its own. The nonviolation right provided in GATT is, thus, a 'safety net' linking the tariff concessions that a government voluntarily negotiates in GATT to commitments over the market access it must subsequently offer to its trading partners.

GATT rules like Article III and reciprocity are not adequate to ensure the effective link between tariff reduction and the export price change. An increasing use of non tariff measures (NTMs) and contingent protection measures could be made to effectively nullify the effect of tariff reduction on market access. The pervasive impact of NTMs was first recognised at international level in the 1960s after the Kennedy Round of negotiations. These are so diverse and sometimes non transparent that their trade distorting effects are difficult to assess (Bhattacharya 1999). NTMs can be imposed on a case by case basis. As a result NTMs application targets the specific items for trade diversion. While the Doha Development Agenda ("DDA") has set out the objective of reducing/ eliminating non tariff barriers, the increasing use of contingent protection measures such as antidumping and CVD which have emerged as the principal form of contingent protection is difficult to reign in. WTO records show that around 63% of the cases initiated during 1995-200 were directed against the developing countries. An analysis of the number of AD duties in force as of 23 October 2003 in the US and as of June 4, 2003 in the EU against developed and developing countries is revealing. More than 60 per cent of the AD duties in the US and around 86% of the AD duties in the EU are against the developing countries (Aggarwal 2003). There are thus a number of barriers that impede the full exploitation of the market access opportunities. In our analysis however we have assumed that tariff reductions effectively provide market access opportunities to foreign exporters i.e. *the price effect of the tariff concessions will not be systematically offset by an increasing use of non tariff barriers and contingent protection measures.*

IV.2 Sensitivity of trade patterns to changes in tariff rates.

Although tariff concessions can be interpreted as accelerating the momentum for a freer world trade, they may not have the desired impact on market access across all the sectors. The effect of tariff concessions on market access of foreign importers depends on the price elasticity of demand and the price elasticity of supply which interact to determine the price elasticity of exports. It is expected that *a tariff will have a greater effect the more elastic the price responsiveness of exports.*

The total market access effect can be decomposed into the competitive and market effect. With fall in the import prices, import demand curve shifts upward increasing import demand from the rest of the world (ROW). This effect termed 'market effect' describes the effect of changes in relative prices on overall imports. If tariff rates are lowered, the market effect will expand the markets. The 'competitive effect' however, suggests that even if tariff reduction results into higher import demand, for an individual country, the effect of such increase may not be significant due to low price elasticity for its products. A country's exports face competition not only from domestic producers in the importing region, but also from "third country" exporters to that region. With fall in the import prices, terms of trade changes for all the exporting countries. However some countries are able to exploit the export potential due to greater price competitiveness, while others fail to do so. Thus, normally the dominant relative price competition occurs among exporters. This is captured by the competitive effect.

Since our focus is on India's exports to the US, we explain the decomposition of total market access effects into the market and competitive effect using a two country model. We assume that there are two countries : Country 1, which is importing and Country 2 which is exporting. Country 2's exports to Country 1 in sector i may be expressed as

$$X_{2i}/ Y_1 = (M_{1i}/Y_1) * (X_{2i}/M_{1i}) \ldots\ldots\ldots\ldots\ldots (1)$$

where: X_{2i} : Country 2's exports in sector i.

Y_1 : Country 1's GDP;

M_{1i} : Country 1's imports in sector i.

The above relationship is purely statistical one and not based on any behavioural assumptions. This implies that

$$\text{Log } (X_{2i}/ Y_1) = \log(M_{1i}/Y_1) + \log (X_{2i}/M_{1i}) \ldots\ldots\ldots\ldots (2)$$

By differentiating (2) by the relative export price, P. One gets

$$\Delta \log (X_{2\,i} / Y_1)/ \Delta \log P = \Delta \log (M_{1\,i} /Y_1)/\log P + \Delta \log (X_{2\,i} /M_{1i})/\log P \ldots(3)$$

In other words, percentage change in the exports of Country 2 normalised by GDP of Country 1 relative to percentage change in the export prices is a sum of the two components : one, percentage change in the $M_{1\,i} /Y_{1,}$ which represents the market effect and two, the percentage change in the market penetration ratio $X_{2i} /M_{1I,}$ which shows the competitive effect.

Thus, negotiations on tariff reduction are not expected to result in automatic market access in all the sectors. Much depends on the p-competitiveness of a country's exports and the sensitivity of imports to price reduction.

IV.3 The Model

To quantitatively assess the impact of tariff reduction on India's exports and decompose the changes in India's exports into the market and competitive effects, we employed three economic models which explained : (i) India's exports in the US markets ; (ii) The US import demand; (iii) India's market penetration in the US markets.

The export function is defined as :

$$X_{it,ind} = f(Y_{t,us}, ADJPRICE_{it})$$

where

$X_{i,ind}$: India's exports in sector i in year t ,

$Y_{t,us}$: the US GDP in year t and

$ADJPRICE_{it}$: adjusted relative prices in sector i in year t. It is calculated in the following manner :

$ADJPRICE_{it}$: $((P_{it,us}/P_{it,ind})\,(exch_t))/(100+t_{t,us})$

Where $P_{it,us}$ refers to India's price in sector i in year t, $P_{it,us}$ is the US price in sector i in year t, exch refers to the expchange rate in year t and $t_{t,us}$ is the US tariff rate in year t. Normalising the above function by $Y_{t,us}$ we get,

$$X_{it,ind} / Y_{t,us} = f(ADJPRICE_{it})$$

The above model is based on the conventional export function. The standard theory argues that the foreign country's income and the level of relative prices determine exports of either a single commodity or of the commodities in aggregate. We extended the model by incorporating the exchange rate and tariff rate variables, both of which influence the relative price level between two countries. Indian exports are, thus, a function of the US income and the adjusted relative prices. The relative-price term (ADJPRICE) that appears in the above model is the ratio of the US price to the Indian prices adjusted for the exchange rate and tariff rate. Theoretically, the sign of $ADJPRICE_i$, as it is defined should be positive. In other words as the price of US goods relative to Indian exports increase, demand for India's exports would also increase. If the tariff rates increase, other things remaining the same, the relative prices would decline, reducing the demand for India's exports.

While modeling the US import demand function, the conventional specification that real imports are determined by domestic income and the international purchasing power of the local currency is assumed (Houthakker and Magee, 1969; Leamer and Stern, 1970; Murray and Ginman, 1976; Goldstein and Khan, 1985; and Carone, 1996). We extended the model by incorporating a tariff variable and employed the following functional form :

$$M_{it,us} = f(Y_{t,us}, REER_t, T_t) \quad \text{.....(2)}$$

Where $M_{it,us}$ is the import demand in sector i in year t, $Y_{t,us}$ refers to the US GDP in year t, REER refers to the real effective exchange rate (REER) and T_t refers to the tariff rate. The REER is the single trade weighted index of the real exchange rate index (RERi) where RER is the nominal exchange rate (index) adjusted for price changes in the domestic economy relative to those of trading partners'. REER indicates the country's international competitiveness. An appreciation of the REER will be a lower cost of imports, all other factors held constant. This could lead to an increase in real imports demanded. Conversely

a fall or depreciation of the REER will be reflected in a higher cost for imports leading to a decline in the volume demanded. The lowering of tariffs is expected to affect imports negatively.

For analysing the market penetration effect, we adopted the following model :

$$X_{it,ind} = f(M_{it,us}, ADJPRICE_{it})$$

Which implies,

$$X_{it,ind}/M_{it,us} = f(, ADJPRICE_{it}) \text{ ..... (3)}$$

This is based on the standard export model (1). However, it includes $M_{it,us}$ instead of Yus as in model (1). This is because its objective is to examine India's penetration into the US import market.

All the three models were log transformed before these were put to an empirical test. The log-transformed equation can be represented as below.

$$\text{Log}(X_{it,ind} / Y_{t,us}) = a_1 + a_2 \log(ADJPRICE_{it}) + u_1 \text{ ..... (a)}$$
$$\text{Log}(M_{it,us}/Y_{t,us}) = b_1 + b_2 \log(REER_t) + b_1 \log(T_t) + u_2 \text{..... (b)}$$
$$\text{Log}(X_{it,ind} /M_{it,us}) = c_1 + c_2 \log(ADJPRICE_{it}) + u_3 \text{.....(c)}$$

While model (a) was used to estimate the total price effect, model (b) and (c) determined the market and the competitive effect respectively. All these equations were estimated using the OLS technique.

IV.4 Data, Variables and Methodology

The basic data source is the *Trade and Production Data*base. The construction of this database has been funded by the World bank's Research Support Budget and the Export Promotion Thematic group. It contains trade, production and tariff data for 67

developing and developed countries at the industry level over the period 1976-1999. The sector disaggregation in the database follows the International Standard Industrial Classification and is provided at the 3 digit level (28 industries for 67 countries and at the four digit level (81 industries) for 24 of these countries. The database merges trade, production and tariff data available from different sources. The United Nations Industrial Development Organisation is the source for production related data. The source of the trade data is United Nations Statistics Department's *Comtrade database*. The World Bank's World Integrated trade Solution (WITS) is used to mirror trade using partners data. Trade data is aggregated by region and income levels according to World Bank's definitions. A separate dataset is provided as well that includes partner-wise trade flows at the industry level. The three sources of MFN average tariffs are, one, UNCTAD's Train database, two, WTO's Trade Policy Review Series and three, the internet version of Integrated Database. The various agencies utilise different classifications in the collection of the data. This database has filtered the data into the ISIC classification after matching different classifications.

The database contains trade, production and tariff data for the US at the 4 digit industry level over the period 1989-1999. The sector disaggregation in the database follows the International Standard Industrial Classification (ISIC). Ten annual observations are afforded ranging from 1989 to 1999. This is again due to data constraint but one may justify the choice by arguing that the reduction in tariff rate occurred only in the latter part of the period covered.

Data on the 'real effective exchange rate' (REER) was collected from the relevant issues of International Financial Statistics while the sectoral price data is based on the information provided on the US government website : www.us.gov

V Market Access Estimates

V.1 Sectorial Impact of Tariff Reduction

Statistical analysis reveals a significant price responsiveness of India's exports directed to the US in 44 of 81 products (at the 4-digit level of aggregation). Some studies, as those by Bhagwati and Srinivasan (1975), Wadhwa (1998), Srinivasan (1998) provide evidence of India's exports being price responsive. Most econometric studies as those by Virmani (1991), Joshi and Little (1994), Krishnamurthy and Pandit (1995) and Roy (2002) also point to significant price responsiveness of India's exports. Theoretically however, one would expect the price responsiveness of exports to differ across commodities (as discussed in Section IV). Lucas (1988) also finds varying price responsiveness across commodities. Our results thus support the theoretical assertion as well as the empirical evidence.

Table 7 lists the industries (at the 4-digit level of industry disaggregation) in which price responsiveness of exports was found to be insignificant. Contrary to the expectations Indian exports directed to the US in

Table 7: Sectors where price responsiveness was insignificant for the period 1989-99

Broad Industry Group	Industry at the 4-digit level of disaggregation
Food, Beverages and tobacco	Slaughtering preparing and preserving meat Manufacture of dairy products Grain mill products Manufacture of bakery products Sugar factories and refineries Manufacture of cocoa chocolate and sugar confectionery Manufacture of food products not elsewhere classified Manufacture of prepared animal feeds Distilling rectifying and blending spirits Wine industries Malt liquors and malt Tobacco manufactures
Textiles	Spinning weaving and finishing textiles Knitting mills Manufacture of carpets and rugs Cordage rope and twine industries Manufacture of textiles not elsewhere classified Manufacture of wearing apparel except footwear
Leather, paper, wood,	Tanneries and leather finishing Fur dressing and dyeing industries Manufacture of footwear except vulcanized or moulded rubber or plastic footwear Sawmills planing and other wood mills Manufacture of wooden and cane containers and small cane ware Manufacture of wood and cork products not elsewhere classified Manufacture of furniture and fixtures except primarily of metal
Chemicals	Petroleum refineries Manufacture of miscellaneous products of petroleum and coal
Metals and non metals	Manufacture of cement lime and plaster Manufacture of non-metallic mineral products not elsewhere classified Non-ferrous metal basic industries Manufacture of structural metal products
Engineering	Manufacture of engines and turbines Machinery and equipment except electrical not elsewhere classified Manufacture of electrical industrial machinery and apparatus Manufacture of motorcycles and bicycles Manufacture of aircraft Manufacture of musical instruments

Source: Author's estimates based on the Trade and Production Database

several resource and labour intensive industries were found to be insensitive to price change. However, this result is in all likelihood substantially due to the trade diversion effect of NAFTA preferences in favour of suppliers in Mexico, which is a competing country. How serious the trade diversion effect of the NAFTA is can be gauged from the

growth of Mexico's export to the USA in some of these sectors after the NAFTA was established.

Table 8: Change in Exports from Mexico to the US in selected sectors: 1989-91 to 1997-99

(Number of times)

Description	Ratio of average exports during 1997-99 to that over 1989-91
Spinning weaving and finishing textiles	4.9
Manufacture of made-up textile goods except wearing apparel	27.4
Knitting mills	155.7
Manufacture of carpets and rugs	1.6
Cordage rope and twine industries	2.9
Manufacture of textiles not elsewhere classified	20.3
Manufacture of wearing apparel except footwear	69.9
Manufacture of paints varnishes and lacquers	6.8
Manufacture of chemical products not elsewhere classified	7.2
Tanneries and leather finishing	4.1
Fur dressing and dyeing industries	14.4
Manufacture of products of leather and leather substitutes except footwear and	16.5
Manufacture of footwear except vulcanized or moulded rubber or plastic footwear	7.6

Source : Trade and Production data

Comparing the figures of Mexico's exports to the USA during the triennium 1989-91 with those in the triennium 1997-99 it is seen that there was a phenomenal increase in certain product groups (Table 8). Exports of made-ups increased about 27 times, of apparel about 70 times, leather manufactures by about 14 times and footwear by about 8 times. Table 9 shows that during this period, India's share of the US market went up from 1.6 to 2.8 per cent for made-ups while that of Mexico increased from 1.6 to 13.8 per cent. In apparel India increased its share from 2.8 to 3.3 while Mexico's went up from 0.3 to 12.6 percent. In leather manufactures India's share increased from 1.5 to 2.3 while that of Mexico from 0.7 to 5.6 per cent. In footwear India's share declined from 0.9 to 0.8 per cent while that of Mexico went up from 0.7 to 3.3 per cent. These are the product groups in which India has export interest and at the same time the MFN rates are relatively high and no concession is granted to developing countries under the Generalised System of Preferences. To some extent the difference is also accounted for by the fact that textile and

apparel items have quantitative restrictions applied to them under the WTO Agreement on Textiles and Clothing, which would be phased out at the end of 2004.

Table 9 : Average Share of India's and Mexico's exports in the total US imports in selected sectors : 1989-91 and 1997-99

(%)

isiccode	Description	Share of India's exports in US imports (%)		Share of Mexican exports in the Us exports(%)	
		1989-91	1997-99	1989-91	1997-99
3211	Spinning weaving and finishing textiles	3.8	5.4	4.3	13.8
3212	Manufacture of made-up textile goods except wearing apparel	1.6	2.8	1.6	13.6
3213	Knitting mills	0.7	2.2	0.2	10.3
3214	Manufacture of carpets and rugs	21.4	21.5	3.5	3.8
3215	Cordage rope and twine industries	0.1	1.2	10.4	18.0
3219	Manufacture of textiles not elsewhere classified	0.1	0.6	0.9	9.9
3220	Manufacture of wearing apparel except footwear	2.8	3.3	0.3	12.6
3231	Tanneries and leather finishing	3.1	1.0	3.4	9.3
3232	Fur dressing and dyeing industries	0.0	0.0	0.8	10.7
3233	Manufacture of products of leather and leather substitutes except footwear and	1.5	2.3	0.7	5.6
3240	Manufacture of footwear except vulcanized or moulded rubber or plastic footwear	0.9	0.8	0.7	3.3
3511	Manufacture of basic industrial chemicals except fertilizers	0.6	0.7	3.9	2.2
3512	Manufacture of fertilizers and pesticides	0.3	0.9	5.5	5.4
3513	Manufacture of synthetic resins plastic materials and man-made fibres except gl	0.2	0.5	4.9	7.4
3521	Manufacture of paints varnishes and lacquers	0.0	0.1	1.9	3.3
3522	Manufacture of drugs and medicines	1.4	1.0	1.0	0.9
3523	Manufacture of soap and cleaning preparations perfumes cosmetics and other toi	0.2	0.6	2.3	6.7
3529	Manufacture of chemical products not elsewhere classified	0.3	0.6	3.1	10.7

Source : Trade and Production data

Thus, the non- responsiveness of India's exports to relative price changes in several resource and labour intensive industries reflects the difference that a FTA can make in areas in which the MFN tariffs are high.

India's exports for 44 products were found to be significantly price responsive. Of these 44 commodities, 42 were relevant to us. This was because, two sectors, namely, agricultural machinery and equipment and cement, lime and plaster already had zero

average tariff rates. Our analysis therefore is focused on 42 products. Since India's exports in these products are price responsive, they could be targeted as export items with high growth potential.

While examining these products, one may observe that these items include simple labour intensive, resource intensive as well as technologically sophisticated items. Table 10 presents the classification of these products according to the broad categories of industrial products. These categories are based on the UN-ESCAP classification scheme with minor modifications (Tendulkar 1999). Apparently, a large number of chemical, electrical, transport and metal industries were benefited in terms of significant increase in exports by tariff reductions in the post Uruguay round. Some food processing, leather and paper industries also improved their export performance significantly.

Table 10: Classification* of 42 products across broad categories of industrial products

Resource intensive	Labour intensive	Scale intensive	Differentiated	Science based
Canning and preserving of fruits and vegetables	Made-up textile goods except wearing apparel	Soft drinks and carbonated waters industries	Metal and woodworking machinery	Manufacture of drugs and medicines
Canning preserving and processing of fish crustacea and similar foods	Products of leather and leather substitutes except footwear and	Pulp paper and paperboard articles not elsewhere classified	Special industrial machinery and equipment except metal and - woo	Soap and cleaning preparations perfumes cosmetics and other toilet preparations
Vegetable and animal oils and fats	pulp paper and paperboard	Printing publishing and allied industries	Office computing and accounting machinery	Radio television and communication equipment and apparatus
Structural clay products	Containers and boxes of paper and paperboard	Basic industrial chemicals except fertilizers	Electrical appliances and house wares	Professional and scientific and measuring and controlling equipments
	Cutlery hand tools and general hardware	Fertilizers and pesticides	Electrical apparatus and supplies not elsewhere classified	Photographic and optical goods
	Furniture and fixtures primarily of metal	Synthetic resins plastic materials and man-made fibres	Shipbuilding and repairing	Watches and clocks
	Fabricated metal products except machinery and equipment not - el	Chemical products not elsewhere classified	Railroad equipment	
	Other	Tyre and tube	motor vehicles	

	Manufacturing industries	industries		
		Rubber products not elsewhere classified	Transport equipment n.e.c	
		Plastic products not elsewhere classified		
		Pottery china and earthenware		
		Glass and glass products		
		Iron and steel basic industries		
		Jewellery and related articles		
		Sporting and athletic goods		

*Based on the UN-ESCAP classification scheme adapted by Tendulkar (1999)

Table 11 presents the price elasticity coefficient of the 42 commodities that have been of interest to us. The average price elasticity in these 42 selected sectors was roughly 3%. Since the elasticity coefficient for the transport equipment sector was exceptionally high, we excluded it from our calculation of the average price elasticity. Using the average price elasticity coefficient we categorized the products as higher-than-average elasticity products and lower-than-average elasticity products. One may observe that the industries exhibited higher-than-average elasticity were mainly scale intensive, differentiated or science based products. On the other hand, the exports of resource and labour intensive products recorded lower than average price elasticity. It can also be seen that some science based products namely, drugs and pharmaceuticals, scientific and measuring and controlling equipments and watches and clocks and, differentiated products namely, special industrial machinery and scale intensive chemical products also exhibited lower than average elasticity. It could be due to the niche markets that our exports may have created in these commodities. For instance, in drugs and pharmaceuticals, India's exports focus on the bulk drugs' markets. Since bulk drugs constitute the major raw materials in the production of drugs, price elasticity of India's exports in this market is very low (lower than even 1).

Table 11: Classification of price responsive products by price elasticity

Description	P-elasticity	Description	P-elasticity
Higher than average elasticity		***Lower than average elasticity***	
Manufacture of transport equipment not elsewhere classified	20.194	Manufacture of vegetable and animal oils and fats	2.761
Manufacture of fertilizers and pesticides	7.943	Canning and preserving of fruits and vegetables	2.653
Shipbuilding and repairing	6.655	Manufacture of glass and glass products	2.461
Manufacture of electrical appliances and housewares	6.416	Manufacture of synthetic resins plastic materials and man-made fibres except gl	2.446
Manufacture of pulp paper and paperboard	6.111	Manufacture of special industrial machinery and equipment except metal and – woo	2.268
Manufacture of pulp paper and paperboard articles not elsewhere classified	5.795	Manufacture of chemical products not elsewhere classified	2.119
Soft drinks and carbonated waters industries	5.433	Printing publishing and allied industries	2.085
Manufacture of furniture and fixtures primarily of metal	5.004	Manufacturing industries not elsewhere classified	2.045
Manufacture of containers and boxes of paper and paperboard	4.971	Manufacture of structural clay products	2.011
Manufacture of rubber products not elsewhere classified	4.519	Manufacture of pottery china and earthenware	1.923
Manufacture of office computing and accounting machinery	4.396	Manufacture of motor vehicles	1.922
Manufacture of railroad equipment	4.338	Manufacture of watches and clocks	1.666
Manufacture of plastic products not elsewhere classified	4.279	Manufacture of made-up textile goods except wearing apparel	1.592
Manufacture of soap and cleaning preparations perfumes cosmetics and other toi	4.055	Manufacture of basic industrial chemicals except fertilizers	1.41
Manufacture of electrical apparatus and supplies not elsewhere classified	4.01	Manufacture of photographic and optical goods	1.308
Manufacture of radio television and communication equipment and apparatus	3.663	Tyre and tube industries	1.272
Iron and steel basic industries	3.005	Manufacture of cutlery hand tools and general hardware	1.097
		Canning preserving and processing of fish crustacea and similar foods	1.029
		Manufacture of products of leather and leather substitutes except footwear and	0.984
		Manufacture of sporting and athletic goods	0.979
		Manufacture of metal and woodworking machinery	0.918
		Manufacture of professional and scientific and measuring and controlling equipm	0.793

		Manufacture of drugs and medicines	0.707
		Manufacture of jewellery and related articles	0.550
		Manufacture of fabricated metal products except machinery and equipment not - el	0.316

Table 12 quantitatively evaluates the expected tariff reduction by commodity on the basis of the Chairman's formula. Several countries have submitted their proposals on modalities of tariff reduction in accordance with the Doha Development Agenda. While developed countries such as the USA and the EU advocated ambitious cuts in tariffs as part of a Doha Round Deal, a number of developing countries have expressed concern about budgetary and revenue implications resulting from a sharp cut in import tariffs. The Chairman of the WTO negotiating group on market access of non agricultural goods however, proposed a formula for cutting tariffs that takes a middle path between the two approaches. The formula that closely resembles the reductions proposed by China is as follows :

$$t_n = B*t_a*t_b / B* t_a + t_b$$

where, t_n is the new tariff rate, B refers to an unknown parameter; t_a denotes the average tariff rate and t_b is the base tariff rate.

This formula would require greater reductions on tariffs higher than a country's overall average rate and lower reductions on tariffs below the average rate. The B coefficient which would set the final rate of reduction is to be determined by member countries in the negotiations. A higher coefficient in the formula would mean smaller tariff cuts. [2]

We used the above formula to calculate expected tariff cuts across 42 products. For calculations the coefficient B was assigned two alternative values : 1 and 3. As expected, the new tariff rates with B=1 are lower than the new tariff rates with B=3. Tariff cuts will

[2] One of the highlights of the Chairman's (P.L. Girard) text is the proposed elimination of tariffs on products of particular interest to developing countries. The product sectors are : electronics and electrical goods, fish and fish products, footwear, leather goods, motor vehicle parts and components, stones and gems and textiles and clothing. In this study, we did not analyse the impact of this proposal due to 4-digit level of data aggregation .

be between .004 percent points and 5.4 percent points, if B=3, and .01 percent point and roughly 8 percent points, if B=1. On an average, the tariff rate will be reduced by roughly 1 percent point if B assumes the value 3 and by 1.8 percent point if it is assigned the value 1. Table 12 presents a list of the 42 items by tariff reductions. Apparently, labour intensive and resource intensive products such as leather products and leather substitutes except footwear, made-up textile goods except wearing apparel, canning and preserving of fruits and vegetables will have the heaviest tariff cuts as the current tariff rates are relatively higher on these products. On the other hand, machinery, drugs, fertilisers, paper and pulp which already have relatively lower tariff rates will record the lowest tariff cuts.

Table 12 : Classification of products by tariff cuts

Products with higher than average tariff cuts.			***Products with lower than average tariff cuts.***		
Description	***Tariffcut B=3 (%)***	***Tariffcut B=1 (%)***	***description***	***Tariffcut B=3 (%)***	***Tariffcut B=1 (%)***
Canning and preserving of fruits and vegetables	5.432	7.982	Canning preserving and processing of fish crustacea and similar foods	0.767	1.543
Manufacture of made-up textile goods except wearing apparel	3.687	5.78	Manufacture of cutlery hand tools and general hardware	0.7	1.427
Manufacture of products of leather and leather substitutes except footwear and	3.407	5.413	Manufacture of metal and woodworking machinery	0.652	1.341
Manufacture of plastic products not elsewhere classified	2.78	4.569	Manufacture of sporting and athletic goods	0.646	1.332
Manufacture of railroad equipment	2.611	4.338	Manufacturing industries not elsewhere classified	0.639	1.318
Soft drinks and carbonated waters industries	2.204	3.767	Manufacture of chemical products not elsewhere classified	0.598	1.246
Manufacture of structural clay products	2.051	3.545	Iron and steel basic industries	0.583	1.218
Manufacture of glass and glass products	1.794	3.17	Manufacture of fabricated metal products except machinery and equipment not - el	0.564	1.183
Manufacture of pottery china and earthenware	1.533	2.779	Manufacture of rubber products not elsewhere classified	0.532	1.125
Manufacture of synthetic resins plastic materials and man-made fibres except gl	1.506	2.737	Manufacture of electrical apparatus and supplies not elsewhere classified	0.497	1.06
Manufacture of transport equipment not elsewhere classified	1.383	2.547	Manufacture of photographic and optical goods	0.452	0.976

Manufacture of basic industrial chemicals except fertilizers	1.158	2.193	Manufacture of containers and boxes of paper and paperboard	0.402	0.88
Manufacture of motor vehicles	1.153	2.184	Manufacture of electrical appliances and housewares	0.401	0.878
Manufacture of watches and clocks	1.085	2.076	Manufacture of radio television and communication equipment and apparatus	0.242	0.562
Manufacture of jewellery and related articles	0.98	1.90	Manufacture of soap and cleaning preparations perfumes cosmetics and other toi	0.229	0.534
Manufacture of vegetable and animal oils and fats	0.945	1.845	Tyre and tube industries	0.186	0.444
Average for 42 sectors	***0.99***	***1.79***	Manufacture of pulp paper and paperboard articles not elsewhere classified	0.174	0.417
			Manufacture of professional and scientific and measuring and controlling equipm	0.159	0.383
			Manufacture of furniture and fixtures primarily of metal	0.155	0.376
			Printing publishing and allied industries	0.077	0.196
			Manufacture of office computing and accounting machinery	0.074	0.19
			Manufacture of pulp paper and paperboard	0.057	0.148
			Manufacture of fertilizers and pesticides	0.056	0.145
			Manufacture of special industrial machinery and equipment except metal and - woo	0.052	0.136
			Shipbuilding and repairing	0.021	0.057
			Manufacture of drugs and medicines	0.004	0.011

Table 13 rearranges the products by tariff elasticity and tariff cuts. It shows that in general, the products in which tariff cuts are expected to be higher than average, price elasticity is lower than average and vice versa. The only sectors where both the price elasticity and tariff cuts are expected to be high are : transport equipment, railroad equipment, plastic products and soft drinks and carbonated waters industries. There are also commodities for which both price elasticity as well as tariff cuts are lower than average. These include, resource intensive fish products, labour intensive hand tools and metal products, scale intensive chemical products, differentiated electrical apparatus and science based scientific instruments.

Table 13 : Classification of products by elasticity and tariff cuts

	Higher than average tariff cuts	**Lower than average tariff cuts**
Higher than average P elasticity	Manufacture of transport equipment not elsewhere classified Manufacture of railroad equipment Manufacture of plastic products not elsewhere classified Soft drinks and carbonated waters industries	Manufacture of fertilizers and pesticides Shipbuilding and repairing Manufacture of electrical appliances and housewares Manufacture of pulp paper and paperboard Manufacture of pulp paper and paperboard articles not elsewhere classified Manufacture of furniture and fixtures primarily of metal Manufacture of agricultural machinery and equipment Manufacture of containers and boxes of paper and paperboard Manufacture of rubber products not elsewhere classified Manufacture of office computing and accounting machinery Manufacture of soap and cleaning preparations perfumes cosmetics and other toi Manufacture of electrical apparatus and supplies not elsewhere classified Manufacture of radio television and communication equipment and apparatus Iron and steel basic industries
Lower than average price elasticity	Canning and preserving of fruits and vegetables Manufacture of made-up textile goods except wearing apparel Manufacture of products of leather and leather substitutes except footwear and Manufacture of structural clay products Manufacture of glass and glass products Manufacture of pottery china and earthenware Manufacture of synthetic resins plastic materials and man-made fibres Manufacture of basic industrial chemicals except fertilizers Manufacture of motor vehicles Manufacture of watches and clocks Manufacture of jewellery and related articles Manufacture of vegetable and animal oils and fats	Canning preserving and processing of fish crustacea and similar foods Manufacture of cutlery hand tools and general hardware Manufacture of metal and woodworking machinery Manufacture of sporting and athletic goods Manufacturing industries not elsewhere classified Manufacture of chemical products not elsewhere classified Manufacture of fabricated metal products except machinery and equipment not - el Manufacture of photographic and optical goods Tyre and tube industries Manufacture of professional and scientific and measuring and controlling equipments Printing publishing and allied industries Manufacture of special industrial machinery and equipment except metal and - wood Manufacture of drugs and medicines

Table 14 classifies the products by proportional increase in exports. These estimates are based on the price elasticity coefficient, tariff cuts, sector level relative prices between the two countries and the exchange rate coefficient. Our estimates show that, only 5 of 42 products would record double-digit growth in total exports. These include transport equipments, canning of fruits and vegetables, soft drinks and plastic products. Aside from these products, labour intensive items : made up textiles, resource intensive : vegetable and animal oils, leather and leather products, scale intensive items : glass products, structural clay products, plastic materials, pottery and rubber products and differentiated item : manufacture of electrical appliances and housewares are also likely to record an impressive growth of 5% and above. For all other items, the proportional increase in exports is likely to much less.

Table 14 : Percentage increase in exports

Higher than average		**Lower than average**	
Desription	*% increase*	*Description*	*% increase*
Transport equipment not elsewhere classified	50.506	Manufacturing industries not elsewhere classified	2.654
Canning and preserving of fruits and vegetables	20.669	Manufacture of chemical products not elsewhere classified	2.603
Soft drinks and carbonated waters industries	20.051	Manufacture of pulp paper and paperboard articles not elsewhere classified	2.392
Plastic products not elsewhere classified	19.135	Manufacture of soap and cleaning preparations perfumes cosmetics and other toi	2.144
Manufacture of railroad equipment	18.425	Manufacture of radio television and communication equipment and apparatus	2.039
Manufacture of made-up textile goods except wearing apparel	8.995	Manufacture of furniture and fixtures primarily of metal	1.862
Manufacture of glass and glass products	7.65	Canning preserving and processing of fish crustacea and similar foods	1.563
Manufacture of structural clay products	6.987	Manufacture of cutlery hand tools and general hardware	1.542
Synthetic resins plastic materials and man-made fibres	6.569	Manufacture of sporting and athletic goods	1.285
Manufacture of electrical appliances and housewares	5.564	Manufacture of photographic and optical goods	1.259
Manufacture of pottery china and earthenware	5.243	Manufacture of metal and woodworking machinery	1.212
Manufacture of products of leather and leather substitutes except footwear and	5.207	Manufacture of fertilizers and pesticides	1.139
Manufacture of vegetable and animal oils and fats	5.012	Manufacture of jewellery and related articles	1.025

Manufacture of rubber products not elsewhere classified	5.011	Manufacture of pulp paper and paperboard	0.896
Manufacture of containers and boxes of paper and paperboard	4.319	Manufacture of office computing and accounting machinery	0.829
Electrical apparatus and supplies not elsewhere classified	4.195	Tyre and tube industries	0.559
Manufacture of motor vehicles	4.124	Printing publishing and allied industries	0.405
Iron and steel basic industries	3.608	Shipbuilding and repairing	0.374
Watches and clocks	3.398	Manufacture of fabricated metal products except machinery and equipment not classified elsewhere	0.369
Manufacture of basic industrial chemicals except fertilizers	3.039	Manufacture of special industrial machinery and equipment except metal and - woo	0.306
		Professional and scientific and measuring and controlling equipm	0.301
		Manufacture of drugs and medicines	0.007

Tables 15 provides estimates of the expected absolute increase in total exports by product. Figures for the absolute increase in exports presented in Table 12 are calculated using average exports over the period 1997 to 1999. Our findings suggest that tariff cuts are not expected to benefit India's exports in a major way. With the full implementation of the Chairman's formula for tariff cuts, India's exports directed to the US would increase by roughly 41 million if B=1 and by 76.5 million if B=3. If these figures are applied to 1997-99 average exports for the 42 products, this amounts to 1% increase in India's exports to the US if B=3 and 2% if B=1. *As a proportion of total exports to the US, this works out to be 0.6% and 1.2% respectively.* Of the 42 items which would respond to tariff cuts, only 14 are likely to add $1 million or more to the export bill. Gems and jewellary emerges as the topmost sector that would add around $23 million to the export bill. Since almost 50% of the total exports destined to the US are accounted for by this item only, the results are not surprising. India has long been a major processor of cut diamonds. In the early 2003 when the USA lifted its 5.7% duty on finished jewellery, Sajay Kothari, President of the Gems and Jewellery export promotion council expressed the hope that India's exports could double by 2005. Tariff reduction in this sector should help Indian jewellers fend off growing competition. Other big jewellery-exporting nations, including Thailand, already enjoy tariff-free exports to the U.S. Many Indian jewellers feared that China would become a factor inhibiting India's export growth in this item. However, despite a tremendous

increase in Chinese jewellery exports during the late 1990s[3], Indian exports managed an impressive growth. Other important items would be made-up textile goods, Iron and steel, basic industrial chemicals except fertilizers, plastic products, plastic materials, motor vehicles, radio television and communication equipment and apparatus, food processing, glass and rubber products and edible oils. In contrast, furniture and fixtures primarily of metal, watches and clocks, printing publishing and allied industries, containers and boxes of paper and paperboard, pulp paper and paperboard, soft drinks and carbonated waters, shipbuilding and repairing, drugs and medicines and transport equipment are likely to make insignificantly small additions to our export bills on account of tariff rate reduction.

Table 15 : Absolute increase in exports based on 1997-99 exports (B=1)

Description	**Change export B =1 ($ thousands)**		
Manufacture of jewellery and related articles	22897.82	Canning preserving and processing of fish crustacea and similar foods	852.45
Manufacture of made-up textile goods except wearing apparel	9598.79	Manufacture of electrical apparatus and supplies not elsewhere classified	802.84
Iron and steel basic industries	7178.25	Manufacturing industries not elsewhere classified	599.32
Manufacture of basic industrial chemicals except fertilizers	6093.15	Manufacture of cutlery hand tools and general hardware	487.85
Products of leather and leather substitutes except footwear and	5410.6	Fabricated metal products except machinery and equipment	440.88
Plastic products not elsewhere classified	3537.6	Office computing and accounting machinery	424.56
Synthetic resins plastic materials and man-made fibres except gl	3430.58	Tyre and tube industries	359.27
Manufacture of motor vehicles	2811.25	Manufacture of metal and woodworking machinery	302.05
Radio television and communication equipment and apparatus	2598.45	Soap and cleaning preparations perfumes cosmetics and other toilet preparations	262.12
Canning and preserving of fruits and vegetables	2089.91	Manufacture of fertilizers and pesticides	238.8
Manufacture of vegetable and animal oils and fats	1727.24	Manufacture of electrical appliances and housewares	170.61
Chemical products (n.e.c)	1468.92	Pottery china and earthenware	97.49
Glass and glass products	1087.44	Structural clay products	93.89
Manufacture of rubber products not elsewhere classified	1004.23	Special industrial machinery and equipment except metal and – wood	81.06
		Manufacture of railroad equipment	75.35
		Pulp paper and paperboard articles not	69.15

[3] From 1997 to 2001, Chinese jexports to the U.S. doubled to $712 million, according to the U.S. Commerce Dept.

		elsewhere classified	
		Photographic and optical goods	50.19
		Sporting and athletic goods	39.25
		Professional and scientific and measuring and controlling equipm	37.75
		Furniture and fixtures of metal	30.68
		Manufacture of watches and clocks	26.96
		Printing publishing and allied industries	26.42
		Containers and boxes of paper and paperboard	23.8
		Pulp paper and paperboard	18.55
		Soft drinks and carbonated waters industries	16.31
		Shipbuilding and repairing	13.88
		Drugs and medicines	8.24
		Transport equipment not elsewhere classified	3.74

Table 16 shows that 25 of 42 items would have lower than average percentage change and less than $1 million increase in exports in absolute term**.** Only 5 items namely, food processing, made-up textiles, plastics materials , plastic products and glass products are expected to manage higher than average percentage increase and greater than $1 million increase in exports. Vegetable and animal oils and fats , products of leather and leather substitutes except footwear, basic industrial chemicals except fertilizers, Iron and steel, basic chemical industries, radio television and communication equipment and apparatus, jewellery and related articles and motor vehicles will record lower than average (3%) increase in exports but are expected to add more than $1 million to the export bill. On the other hand, transport equipment, soft drinks and carbonated waters industries, railroad equipment, structural clay products and electrical appliances and housewares will record higher than 3% growth in exports but their contribution to the value of exports will be less than $1 million due to low levels of current exports.

Table 16 : Classification of products by proportional increase and absolute increase in exports

	Higher than average proportional increase	**Lower than average proportional increase**
Greater than 1 million change in exports	Canning and preserving of fruits and vegetables, Manufacture of made-up textile goods except wearing apparel, Manufacture of synthetic resins plastic materials and man-made fibres except gl, Manufacture of plastic products not elsewhere classified, Manufacture of glass and glass products	Manufacture of vegetable and animal oils and fats , Manufacture of products of leather and leather substitutes except footwear, Manufacture of basic industrial chemicals except fertilizers, Iron and steel basic industries Manufacture of radio television and communication equipment and apparatus, Manufacture of jewellery and related articles, Manufacture of motor vehicles
Less than 1 million change in exports	Manufacture of transport equipment not elsewhere classified, Soft drinks and carbonated waters industries, Manufacture of railroad equipment, Manufacture of structural clay products, Manufacture of electrical appliances and housewares	fertilizers and pesticides Shipbuilding and repairing pulp paper and paperboard pulp paper and paperboard articles furniture and fixtures primarily of metal containers and boxes of paper and paperboard rubber products not elsewhere classified office computing and accounting machinery soap and cleaning preparations perfumes cosmetics and other toi electrical apparatus and supplies Iron and steel basic industries special industrial machinery chemical products Printing publishing and allied industries Manufacturing industries pottery china and earthenware motor vehicles watches and clocks Photographic and optical goods Tyre and tube industries cutlery hand tools and general hardware Canning preserving and processing of fish crustacea and similar foods Sporting and athletic goods Metal and woodworking machinery Professional and scientific and measuring and controlling equipments Drugs and medicines Fabricated metal products

V.2 Disaggregation of Market and substitution effect :

For a more detailed analysis of India's export performance we have attempted to decompose changes in India's exports into the competitive and market effects. Model (c) was used to estimate the market penetration effect of tariff change on India's exports while Model (b) was used to calculate the increase in exports resulting from the increase in US import demand. The relationship provided in Equation (3) was used to decompose the two effects. Since the three models were run independently, there were small discrepencies in the results. On an average the error term was as small as 13%. We adjusted these errors to arrive at the final estimates of the market and competitive effect. These are provided in Table 17. One may observe that the expected increase in India's exports due to tariff reductions would mainly be due to the competitive effect. In other words, India's exports would increase primarily due to increase in market penetration. Market growth effect would be small due to low price elasticity of the sophisticated US import markets.

Table 17: Decomposition of total price effect

Code	Description	Market effect (%)	Competitive Effect (%)	Total (%)
3115	Manufacture of vegetable and animal oils and fats	24.08	75.92	100
3134	Soft drinks and carbonated waters industries	15.68	84.32	100
3212	Manufacture of made-up textile goods except wearing apparel	83.27	16.73	100
3233	Manufacture of products of leather and leather substitutes except footwear and	42.44	57.56	100
3412	Manufacture of containers and boxes of paper and paperboard	31.81	68.19	100
3419	Manufacture of pulp paper and paperboard articles not elsewhere classified	11.7	88.3	100
3420	Printing publishing and allied industries	19.93	80.07	100
3512	Manufacture of fertilizers and pesticides	4.05	95.95	100
3523	Manufacture of soap and cleaning preparations perfumes cosmetics and other toilet preparations	13.64	86.36	100
3529	Manufacture of chemical products not elsewhere classified	30.94	69.06	100
3559	Manufacture of rubber products not elsewhere classified	29.06	70.94	100
3560	Manufacture of plastic products not elsewhere classified	29.72	70.28	100
3620	Manufacture of glass and glass products	34.43	65.57	100
3691	Manufacture of structural clay products	31.54	68.46	100
3811	Manufacture of cutlery hand tools and general hardware	59.67	40.33	100
3812	Manufacture of furniture and fixtures primarily of metal	18.38	81.62	100
3823	Manufacture of metal and woodworking machinery	73	27	100
3824	Manufacture of special industrial machinery and equipment except metal and – woo	9.34	90.66	100
3825	Manufacture of office computing and accounting machinery	15.55	84.45	100

3832	Manufacture of radio television and communication equipment and apparatus	14.85	85.15	100
3833	Manufacture of electrical appliances and housewares	6.45	93.55	100
3839	Manufacture of electrical apparatus and supplies not elsewhere classified	27.8	72.2	100
3841	Shipbuilding and repairing	9.48	90.52	100
3852	Manufacture of photographic and optical goods	22.62	77.38	100
3903	Manufacture of sporting and athletic goods	37.92	62.08	100
3909	Manufacturing industries not elsewhere classified	15.44	84.56	100
3710	Iron and steel basic industries	0.0	100.0	100
3113	Canning and preserving of fruits and vegetables	0.0	100.0	100
3843	Manufacture of motor vehicles	0.0	100.0	100
3513	Manufacture of synthetic resins plastic materials and man-made fibres	0.0	100.0	100
3114	Canning preserving and processing of fish crustacea and similar foods	0.0	100.0	100
3551	Tyre and tube industries	0.0	100.0	100
3610	Manufacture of pottery china and earthenware	0.0	100.0	100
3411	Manufacture of pulp paper and paperboard	0.0	100.0	100
3849	Manufacture of transport equipment not elsewhere classified	0.0	100.0	100
3901	Manufacture of jewellery and related articles	100	0.0	100
3511	Manufacture of basic industrial chemicals except fertilizers	100	0.0	100
3819	Manufacture of fabricated metal products except machinery and equipment not – el	100	0.0	100
3842	Manufacture of railroad equipment	100	0.0	100
3851	Manufacture of professional and scientific and measuring and controlling equipments	100	0.0	100
3522	Manufacture of drugs and medicines	100	0.0	100

In at least 9 sectors, transport equipment, pulp paper and paperboard, tyre and tubes, pottery, canning and preserving of fruits, vegetables, fish products, motor, plastic and iron and steel only market penetration/ competitive effect will operate. Import markets in these products have not been price elastic. There are a few items however where market effect alone will be contributing to our export growth. These include scale intensive : jewellery, basic chemicals, metal products, science based : drugs and pharmaceuticals and scientific controlling equipments and differentiated railroad equipments. Made textiles, hand tools and cutlery, and metal and woodworking machinery are the only other exceptions where market expansion is expected to contribute to expansion in India's exports.

In an earlier study Gupta and Ray (1998) also observed that price factor is a significant determinant of India's market penetration in the US imports for a number of

items. Using the constant market share model, Aggarwal (1988) also found that the competitive effect predominated in explaining India's export performance. The predominance of the competitive effect could be explained by the quality aspect of our exports. It is likely that India's exports are positioned at the lower end of the market in terms of value added[4]. These are low quality products and hence are sensitive to price change. Markets for these products are not expected to increase significantly. Exporters are likely to compete for the existing markets in these products on the basis of price. This has an important policy implication which we shall discuss later.

Finally, Table 18 provides a disaggregated analysis of the list of export items which have not been price responsive and hence are not expected to provide increase market access to India due to tariff reduction. It shows that of these 37 items, 18 items do show significant market expansion effect of tariff change. In these items the growing market size is not sufficient for any significant export expansion by India without any increase in its market penetration. For many of these items the major suppliers to the US market are developing countries (3111-3699). If India can indeed compete with them successfully in the US markets these items can become major areas of India's potential exports to the US. In some of these items, namely, grain mill products, food products, knitting mills, carpets and rugs, wearing apparel and non-metallic mineral products India is already an important source of US imports.

In the case of 19 items both the market and competitive effects are tariff inelastic. Tariff reduction in these items is not likely to provide increased market access opportunities.

[4] In many antidumping investigations carried out against Indian exporters in the EU, exporters argued that they were exporting mainly standardised, low value added products produced using standard technology (Aggarwal 2003).

Table 18: Decomposition of total tariff effects for the items which are not price responsive

Market effects are significant		Neither effect is significant	
3111	Slaughtering preparing and preserving meat	3112	Manufacture of dairy products
3116	Grain mill products	3117	Manufacture of bakery products
3121	Manufacture of food products not elsewhere classified	3118	Sugar factories and refineries
3140	Tobacco manufactures	3119	Manufacture of cocoa chocolate and sugar confectionery
3213	Knitting mills	3122	Manufacture of prepared animal feeds
3214	Manufacture of carpets and rugs	3131	Distilling rectifying and blending spirits
3219	Manufacture of textiles not elsewhere classified	3132	Wine industries
3220	Manufacture of wearing apparel except footwear	3133	Malt liquors and malt
3311	Sawmills planing and other wood mills	3211	Spinning weaving and finishing textiles
3319	Manufacture of wood and cork products not elsewhere classified	3215	Cordage rope and twine industries
3320	Manufacture of furniture and fixtures except primarily of metal	3231	Tanneries and leather finishing
3699	Manufacture of non-metallic mineral products not elsewhere classified	3232	Fur dressing and dyeing industries
3813	Manufacture of structural metal products	3240	Manufacture of footwear except vulcanized or moulded rubber or plastic footwear
3821	Manufacture of engines and turbines	3312	Manufacture of wooden and cane containers and small cane ware
3829	Machinery and equipment except electrical not elsewhere classified	3530	Petroleum refineries
3831	Manufacture of electrical industrial machinery and apparatus	3540	Manufacture of miscellaneous products of petroleum and coal
3844	Manufacture of motorcycles and bicycles	3692	Manufacture of cement lime and plaster
3845	Manufacture of aircraft	3720	Non-ferrous metal basic industries
		3902	Manufacture of musical instruments

VI Conclusion

Opening up of the economy must be given a more critical evaluation. The local scenario has to be analysed rigorously, otherwise the policies would give rise to undesirable results. Therefore, a feedback from these policy outcomes has to be sought to enable evaluation of policy suitability in the local context. This study of the impact of tariff reduction on India's exports directed to the US is an attempt in this direction. Our analysis of the Post Uruguay Round experience suggests that India's exports have been price elastic in 44 of 81 products at the 4-digit level of disaggregation. These items contain labour intensive, resource intensive as well as technologically sophisticated items. For

these items there appears to be a scope for expanding India's exports to the US markets with further tariff reductions resulting from the Doha Round negotiations on non agricultural products. This indicates that tariff reduction could be a major contributor to India's export performance. However, the quantitative assessment suggests that tariff cuts are not expected to benefit India's exports to the US in a major way. With the full implementation of the Chairman's formula for tariff cuts, increase in India's exports to the US would amount to 1.2% or 0.6% depending on the value of the B coefficient in the Chairman's formula. These findings are in all likelihood substantially due to the tariff diversion effect of NAFTA preferences in favour of suppliers in Mexico, which is a competing country in many traditional items. It is expected that reduction of MFN tariff would alleviate the trade diversion effect of the NAFTA. As a result, India's export growth in the US market resulting from the Uruguay Round tariff cuts would be much higher in some of the traditional items than that predicted by the study.

Item-wise performance also varies significantly. Although for some products there exists substantial scope for an export increase due to tariff reductions, for most of the items the increase is likely to be very small. Thus all those items which are price elastic need not reflect substantial future potential. The items can be prioritised depending upon their potential increase.

Finally, the evidence suggests that the increase in India's exports would be mainly due to the competitive factor. The market effect of tariff reduction is likely to be very small for most items that display significant price elasticity in India's case. There are a number of products in which India's exports are not price responsive despite the fact that the US market responds to the tariff change. This is due to insignificant market penetration effect of tariff reduction. Many of these items are traditional exports which are exported to the US by developing countries including India. If India can compete with other countries these items can also become high export growth items. It is therefore crucial to improve India's competitiveness vis—a-vis its competitors in different markets.

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